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Xie, Gongnan ; Mitrica, Bogdan ; Xie, Yonghui ; Chen, Yi

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Editorial

Recent Developments in Thermal Insulation and Protection

Gongnan Xie,[1] Bogdan Mitrica,[2] Yonghui Xie,[3] and Yi Chen[4]

[1] *School of Mechannical Engineering, Northwestern Polytechnical University, Shaanxi, Xi'an 710072, China*
[2] *Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN HH), Reactorului 30, 077125 Magurele, Romania*
[3] *School of Energy and Power Engineering, Xi'an Jiaotong University, Shaanxi, Xi'an 710049, China*
[4] *School of Engineering and Built Environment, Glasgow Caledonian University, Glasgow G4 0BA, UK*

Correspondence should be addressed to Gongnan Xie; gongnan.xie@gmail.com

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Thermal insulation is the reduction of heat transfer (the transfer of thermal energy between objects of differing temperature). Thermal protection is the prevention of heat flux (generated by outer heat resources). The practical aim of thermal insulation and protection is to keep the temperature of the objects within the acceptable limit. Thus, in order to obtain fluid flow, heat transfer, and other related physical phenomena in thermal insulation and protection problems, it is necessary to describe the associated physics by means of numerical/theoretical and experimental analysis. Nearly all the physical phenomena of interest are principles of energy conservation, conversation, and management. This special issue is focused on the analysis of typical physical phenomena with respect to thermal insulation and protection.

The main goal of this special issue is to bring together important information about the thermal insulation/protection problems arising from fluid flow, heat transfer, and other related physical phenomena. In this issue we received 13 paper submissions and finally 5 original research papers on the frontier of thermal insulation/protection covering a wide range of topics were accepted for publication based on critical peer-review process. We hope that these topics could be continued to track the updated trends year by year.

A brief review of the accepted papers is addressed here. The paper of "*Thermal-acoustic fatigue of a multilayer thermal protection system in combined extreme environments*" discussed the effects of the thermal load, the acoustic load, and the fatigue analysis methodology on the fatigue damage intensity. In the paper titled "*Numerical study on flow and heat transfer performance of rectangular heat sink with compound heat transfer enhancement structures*", turbulent heat transfer of a heat sink with ribs, dimples, and protrusions was numerically investigated, and the presented results could be referred to the design of thermal protection of gas turbines. The paper of "*Local fractional Fourier series solutions for nonhomogeneous heat equations arising in fractal heat flow with local fractional derivative*" studied the fractal heat flow within local fractional derivative, and then obtained the local fractional Fourier series solutions for one-dimensional nonhomogeneous heat equations, which could be used for thermal insulation problems. In the paper titled "*Investigation on the interface characteristics of the thermal barrier coating system through flat cylindrical indenters*", the characteristics of the interface of thermal barrier coating systems were simulated. Such systems are usually applied to insulate components from large and prolonged heat loads by utilizing thermally insulating materials. The paper of "*Investigation of the mechanical properties of hybrid carbon-hemp laminated composites used as thermal insulation for different industrial applications*" studied the mechanical properties of some hybrid composite laminate panels based on polyester resin reinforced with both carbon and hemp fabrics, which are feasible for thermal insulation applications.

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Gongnan Xie
Bogdan Mitrica
Yonghui Xie
Yi Chen